

25X1A



30 December 1975

MEMORANDUM FOR THE RECORD

SUBJECT: Option Paper  
Project ORACLE (TMS-2 Mass Storage System)

STAT REFERENCE: A. Ampex Contract [redacted] (FFP)  
B. Ampex Contract [redacted] (CPFF)

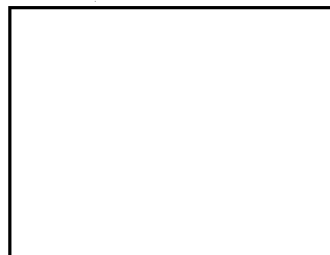
I. The purpose of this memorandum is to summarize the current status of Project ORACLE and to set forth the various courses of action available to the Government.

II. Background:

The ORACLE Program provides for the development and installation of a Mass Storage System (MSS) for the Office of Joint Computer Support. The selection of Ampex as the contractor resulted from the issuance of a Request for Proposal on 1 December 1972 to nine corporations. Four corporations submitted proposals. These were: (1) Ampex Corporation; (2) Grumman Data Systems Corporation; (3) Precision Instruments; and (4) Control Data Corporation. After completion of the evaluation process, Ampex was selected as the contractor to provide the Mass Storage System and two contracts were awarded to Ampex with effective dates of 11 June 1973 and completion dates of 30 August 1975 respectively.

STAT Contract [redacted] was written as a firm fixed price contract. The contract (as amended) provides for the following:

Increment I Equipment  
Increment II Equipment  
(Option) (Not Exercised)  
Accommodation Procurement (GFE)  
Equipment Rental  
  
Total Contract Price



STAT

Page 2

STAT

Contract [ ] is a cost plus fixed fee contract under which Ampex Corporation is to perform the role of system engineer for the Mass Storage System. Deliverables under the contract include software, SCP/EDCP Interface (2 each), manuals, and technical and financial status reports. The contract also includes as deliverables all hardware being procured under Contract [ ]. The CPFF contract states: "As the items thereunder are accepted by the Government their accountability shall be transferred to this contract to be incorporated into the end item identified as the Mass Storage System. All shall be subject to Article 19 of Section E of the General Provisions." (Article 19 is the Government Property Clause). During May of 1975, negotiations were conducted at Ampex to establish a revised program schedule and to establish the amount of a significant cost overrun under the cost plus fixed fee contract. The completion dates of both contracts were changed from 30 August 1975 to 30 August 1976 respectively. The estimated cost of the CPFF contract was increased from [ ] reflecting a projected overrun of [ ] versus an overrun of [ ] proposed by the contractor. A ceiling price of [ ] was agreed to by the parties. The contract has an estimated cost of [ ] and a fixed fee of [ ].

STAT

STAT

STAT

STAT

On 4 December 1975, the Government sent a message to Ampex Corporation which expressed the Government's dissatisfaction with the contractor's performance under subject contracts. On 18 December 1975 representatives of the contractor and the Government met to discuss the status of the ORACLE Program.

### III. Current Status:

The current status of Project ORACLE is summarized as follows:

A. The contractor concedes that he is at least six months behind schedule.

B. The contractor is deviating from contract specifications. If the contractor agreed to meet contract specifications, he would require additional time to complete the work.

Page 3

C. Unless the contractor can provide evidence of excusable delay, the Government should be able to sustain a default termination of both contracts.

Attached hereto are Exhibits which document points A, B, and C above.

STAT Exhibit A - Legal Analysis of Ampex  
Contracts [redacted] (dated 17 December 1975)  
Exhibit B - Copy of Message to Ampex dated 4 December 1975  
Exhibit C - Minutes of Meeting of 18 December 1975  
Exhibit D - Technical Status of Project ORACLE

#### IV. Options Available to the Government:

The only viable options available to the Government are to permit the contractor to continue working under revised contract delivery schedules or to terminate for default.

Allowing the contractor to continue performance presents the following problems:

- (1) What is a revised realistic program schedule?
- (2) How do we force the contractor to meet the contract specifications?
- (3) By allowing additional time, are we lessening the probability of sustaining a termination for default of the fixed price contract?

A termination for default at this time provides for the possibility of recovering funds as follows:

<u>Contract</u>	<u>Amount</u>	<u>Probability of Recovery</u>
Increment I Equipment [redacted] FFP)	[redacted]	Very Good

Page 4

STAT

Contract   
(CPEE Termination)

Amount

Probability of Recovery

Costs through January 1975

Zero

Fee

Very Good

STAT

STAT

Contract   
(Ceiling Price Termination)

Amount

Probability of Recovery

Costs through January 1975

Good

Fee

Good

STAT

C/SC&PS/OEL/DDS&T

STAT

STAT

[Redacted]  
Main Post Office  
Washington, D. C. 20013

REGISTERED

Ampex Corporation  
Advanced Technology Division  
Terabit Memory Systems  
1020 Kifer Road  
Sunnyvale, California 94086

Attention: Mr. William Cassell

STAT Subject : Contract No. [Redacted] and  
Contract No. [Redacted]

Gentlemen:

You are notified that the Government considers your progress to date is endangering performance of subject contracts in accordance with their terms. Our concern was formerly expressed in the Government's message of 4 December 1975. As a result of the 4 December 1975 message, a meeting between representatives of Ampex Corporation and the Government was held on 18 December 1975. At the 18 December 1975 meeting, Ampex Corporation representatives confirmed the Government's belief that the contract performance schedules could not be met.

STAT Amendment No. 6 of Contract No. [Redacted] and Amendments No. 5 and 6 of Contract No. [Redacted] were supplemental agreements which established a revised program schedule. The completion date of both contracts was changed from 30 August 1975 to 30 August 1976. During our meeting of 18 December 1975, Ampex representatives stated that the key milestone date for completion of O/S ASP is now projected for November 1976 in lieu of the May 1976 date established in the revised program schedule. This slippage translates into a projected six-month extension of the completion dates of subject contracts. Such slippage is not acceptable to the Government. It is important to note that the November 1976 projected date for the completion of O/S ASP is based upon Ampex Corporation's delivering a system which is not in accordance with the requirements of the contracts. Ampex's position in this regard is also considered grounds for default termination. The areas of issue are as follows:

STAT

a. Ampex is required to provide the Mass Storage System with a capability such that a stand-alone Storage Control Processor (SCP) can access a Transport Driver (TD) for the purpose of initialing a TBM tape while the system is also performing its normal production functions.

b. The Mass Storage System consists of five basic hardware modules. A standard configuration allows for two (2) Storage Control Processors, two (2) External Data Channel Processors, up to six (6) Transport Drivers, up to thirty two (32) Dual Transport Modules and up to three (3) Read/Write Data Channels. Each SCP shall be switchable to any Transport Driver. Any Transport Driver shall be capable of exercising control over any Data Channel and any Dual Transport Driver Module within a standard configuration through the switching matrices. Each EDCP shall be switchable to any Read/Write Channel.

c. Access to the private disks of the Mass Storage System must be provided by disk control units that are shared among the SCP's and EDCP's.

d. Functions must be split and/or shared between the two Storage Control Processors.

Ampex Corporation did not present any evidence to reflect their position that the items mentioned above were not required by the contracts. If Ampex Corporation should concede that these items are required, the completion dates of the contracts would have to be extended even further.

The Government also considers the Redwood City PSAT demonstration as a strong indicator of lack of progress. The Redwood City PSAT failed because of deficiencies in both the hardware and software. Although the Redwood City PSAT was a minimal exercise, the failure encountered prevented the Government from testing all functions originally planned. In assessing your position regarding the results of PSAT, the Government disagrees with some of your statements concerning functions which should not have been tested at PSAT because they were either recovery related functions as specified in Section 6 of the Mass Storage System Design Specifications, or that they were simply not considered a part of the Release 1 software. In summary, the Government does not share your optimism as to what the Redwood City PSAT demonstrated as far as your progress is concerned.

Page 3

There are indications of problems with regard to the Mass Storage System hardware associated with tally track processing. For each tape block the tally track contains the following information: date of last activity, read and write count, last operation, read only interlock and error counts. To date we do not have any documentation which shows the status of this hardware.

STAT The Government is not aware of any excusable delays with respect to your failure to perform within the requirements of the schedules of the contracts. Therefore, unless the contractor can demonstrate that the conditions cited above can be cured within ten (10) days after receipt of this letter, the Government may terminate subject contracts for default under Article 14 of Section E of the General Provisions of Contract No. [ ] and Article 13 of Section B of the General Provisions of Contract No. [ ]. The rights and remedies of the Government provided for in the aforementioned articles are not exclusive but are in addition to any other rights and remedies provided by law or under the contracts. STAT

The Government acknowledges receipt of your letter dated 23 December 1975 wherein you stated that your presentation of 18 December 1975 was not to be considered your formal position in response to the Government's message of 4 December 1975. However, due to the seriousness of the situation as we view it, it is considered necessary to issue a formal cure notice at this time.

Very truly yours,

[ ]  
Contracting Officer

STAT

18 Dec 75 - AMPEX MGMT MEETING -

Review of PSAT Data:

Re - Agency concern is PSAT -  
agreed. PSAT was real concern.

STAT

Slingsland:

re Q in Oct w/n we should go into PSAT  
He wanted to go forward w/ PSAT Redwood.  
but wanted "joint discovery" rather than  
P or a fail. - this was due to lack of  
meaningful milestones since passing Backfill.

Planned to run for 30 days before actual PSAT  
but didn't have 30 days before  
ran PSAT the Sunday before the PSAT.  
∴ Modified AMPEX ground rule.

[ Henry: - Oct meeting wasn't there same yr  
actually running PSAT? -

early test created files that were used in balance  
of test. Result: test pkg req "perfect" hardware  
performance that AMPEX hadn't anticipated.

∴ Since Ampex didn't have complete software only  
they felt they could demonstrate (or system  
test) based on a joint discovery

Release I

AMPEx acknowledges

\* - Didn't realize dependency based upon  
test sent in October.

[ Decend Push to Tape Ascend - Tape to Disk ]



slingshot  
 noordinate # Ascend/Descent failures occurred.  
 in past 4 days of testing

- \* Dramatic improvement in system reliability  
 after installation of Read-Verify & Data  
 Channel Adjustment.

### TB'Gnd Summary

20 tests

31 hrs testing 8 hrs stand alone

### Descent Data - Dish to Tape

Total Attempts	231
successful	205
failed before corrective	20
failed after corrective Actn	6

### Ascend Tape to Dish

Total Attempts	126
Successful	116
failed before corrective	10
failed after "	0

Conclusion : No file lost after corrective Actn Implemented.

## Feature - Conversion Action Summary

64 occurrences

46 Hardware related

18 software related

① fixes implemented for all Release I features except  
set segment size < 10 scheduled for final

② Remaining items all related to recovery +  
scheduled for final release.

→ Re 46 Hardware features

26 occurrences - Recreating data from Disk to Tape

20 prior to installation of fixes

6 after Read Verify Software + Data Channel Adjustment,  
All related to Recovery NOT Supported By Release I.

10 occurrences

Access Tape to Disk

None after fix

2 occurrences

DA-11 DEC Interface between SCP + EDCP

replace/replace

8 occurrences

Channel Simulator / Transport Driver Interrupt  
Handling Decision Error caused Hard System Abort

~~error~~  
conversion Action Implemented

→ Software features

12 functional deficiencies - Release I software

11 corrected

1 partial capability

6 occurrences

Final Release Recovery.

Q - Interpretation of test results  
we must prove that they were  
aware of test req's mts + results to  
be achieved rather than feel that  
results weren't what we wanted.

Tracy

"Bad track" - cyl 28 Track 8 + cyl 28 Track 5

STAT

\*

[ ] - this isn't the problem - it's hard, hardware problem

~~problem~~

Q

for bad track req possible change of buffers  
or copy cylinders -

Bill - pack ...

Tracy - we weren't allowed to change the pack

STAT

[ ] said ~~that~~ he never said that -

STAT

\*

what does test spec say about this point?

[ ]

Point that concerns me is that Ampex has known  
about it for 2 1/2 yrs - and done nothing  
to correct it - kept putting it off -

\*

chief -

we recognize it has to be corrected - only question is  
when

get it  
explained

Recall Vamby Installed after IBM ...  
reason <sup>installed</sup> attributable to pbr in trying to access  
files

Tracy

Harry Removable block - had made a tape.  
system worked as it was supposed to.

Drive Software Pblm.  
- op<sup>commercial</sup> ~~commercial~~ vs. programming - ?

segment time <sup>limit</sup> can't set time limit to 1 ? (10 vs. 1)

✓ Drive set up error vs program error = said mistake  
made manually by her - as an operator <sup>but</sup> not program  
error.

one disk vs 2 disks -

~~\_\_\_\_\_~~

STAT

What's Error Recovery difference of op<sup>min</sup> re definition.  
See Spec

~~Development~~

Development rather than a IBM finished product  
PSAT premature but joint decision.

Early Jan 75 AMPEX preparing internal  
PSAT.

Tracy Performance.

Ability to Process Files

MSS Design Spec.

AMPEX considers this to be a PERFORMANCE SPEC.  
against which final system can be tested

System Availability

MSS Design Spec

section 11.5 guarantees System up-time in excess of 95%

Data Reliability

Oracle MSS System.

Set 12.2 - defines dependencies ~ Set 10.2

Accuracy on media reliability. This translates  
into following requests:

Write < Descend >  
sequential tape only  
Read Verify  
automatic Remark

Read < Ascend >  
Reread  
Extended Runway Procedures

Proposal has ...

## Summary -

### PSAT :

1. Basis cap of H'ware & S'ware to do MSS function  
AMPEx - we've implemented fixes & will  
continue to do so.

2. Content of PSAT

AMPEx : we don't have agmt as to content  
of test but that's all behind  
us.

AMPEx Propose : Technical working  
session to address tech question  
a several day get together & look  
at software status.

AMPEx thinks there's a problem of  
definitive -

✓ following technical meeting reschedule  
the PSAT.

Tech meeting in early Jan 1976 in  
Sunnyvale.

Definition: TDIF: Transport Driver InterfaceSlingland

4 Items from TP B May.

1<sup>st</sup> issue: Concurrent access to individual transport driver for both storage control processors

AMP2X: Not required by K or Spec

retained - TDIF design enables only 1 TDIF to be in control of the SCP/TO interconnect Bus at any given time

MSS Design/spec cable diagram on pg 172 indicates single cable

architecture conformal via Oracle Maintenance & Diagnostics pg 150 R2

STAT

- spec - maint possible w/ system running  
TBM tape .... with design  
it's impossible.

see 2-41 Original Proposal TP 3

Tapey: offline maintenance - must define what hardware we're talking about

Slingland anomalies in spec:

Q - Can we get outside to support our position i.e. that our interpretation is the only reasonable one - not just that our interpretation is reasonable.

shingled

2<sup>d</sup> ISSUE

Maximum Hdr conf 1 LTD, 64 Tape Transport  
3 DC, 6 EDCP doesn't have perfect switching

AMPLEX position: - we will provide perfect switching capability when Agency order maximum hardware configuration.

STAT

[ ]

are you saying we have to buy whole system before we get perfect switching. There were no qualification in our spec.

STAT

Tracy: There's no ref to perfect switching in spec.

[ ]

MSS Gen Syst Spec. Exhibit I to CPFFK XG 3766 - Amdt 1 This doc defines gen Scope:



Shingled - That's a general spec - but not embodied in Design Spec. 19 Mar 75 which came later.

25X1A

[ ]

That's primarily software -



- CAUTION

- if it's not there in design spec we can't hold them to it.

Q - what's legal position of Gen'l spec vis a vis Design Specification.

Check this out w/ [ ] - See where in k it says this.

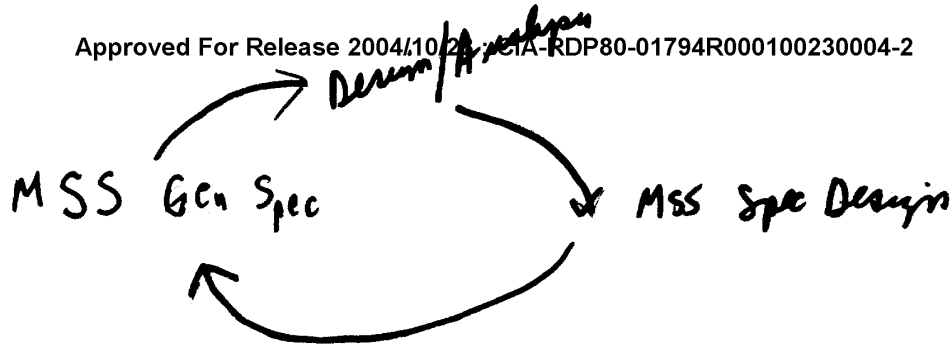
STAT

83

AMPLEX - our view is that MSS Design Spec supersedes anything that went before this.



Slingshot



STAT

**Item 3**

☐: Storage Control Processor requires a dedicated disk controller to access the MSS' private files.

AMPEX: TMS 2 MSS can operate w/ shared BSS/MSS Controller. AMPEX recommends a dedicated disk controller for performance considerations.

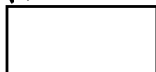
Technical

- Dedicated disk & controller included in original proposal pg 4-5 + in MSS Design/Spec pg 7-8

- System Architecture is such that in a 2 controller system as proposed by Agency where both EDCPs are connected + storage files, SCPP can't access put disks for file request processing

see 4-5

AMPEX



- specs call for dedicated controller. Proposal calls for non dedicated controller -

2-24 Table : 2-36 P2 ; 2-25 ; 3-1 ; 4-1.

STAT

**ITEM 4** ISSUE : Functions are not split and/or shared between the 2 Storage Control Processors.

① AMPEX : High confidence that software resident in a single SCP will meet system performance needs.

② Primary reason for <sup>2d</sup> SCP is system redundancy

③ AMPEX error, - should have advised Agency sooner

Rationale : -

- ① SCP not limiting element in system perf
- ② AMPX "cost to complete" estimate used

AMPX 5-1 TP 1,2  
 Program 5-2 TP 2,3,4  
 5-11 TP 5  
 5-12 TP 2  
 5-14 TP 2  
 2-10 TP 5,6,7.

MSS design 113 TP 2

all talk about  
 MASTER / SLAVE  
 Approach

Q - what's master Slave Approach ?

Fred: Table 12 19 March. Spec'd performance  
can be met or exceeded -

Performance limits: 1 DSS (searches)

2 Private Disk (search)

3 SCP Core Memory

4 SCP Cycles  
Also Host O'head etc.

2 SCP vs 1 SCP argument -

(Q. What's meant by degradation?)

~~Advantages~~

~~more reliable in Hosts~~

Tallian - AMPX intends to live up to the K.

Marketplace - based upon what the Ampx is doing for Agency

More homework must be done. w/in scope + intent  
1st 6 mos Ampx put together a Software spec. thru Sept spent 2 months days in putting together an exceptions list  
- feels now Ampx suffering but will try to ~~spend~~ do R+D to ~~start~~ start its done +  
Communicated to Agency there's no other meaningful way

Schedule: distinct idea for finish -  
would be able to complete thru  
Sunnyvale May '76 Ship July '76  
final November 76

based on assumption they were on right track - that Reduced PSAT would be repeated early Jan 76

See TMS-2 Delivery Schedule  
Completion Planning.

Tallian - before July Amult's, comp freeze and  
Ampx moved people off contract.  
New Hires - when -

STAT

1<sup>st</sup> Rough Draft

Ampex Corporation

STAT

Subject: Contract No.  and Contract No.

STAT

Gentlemen:

1. You are notified that the Government considers your progress to date is endangering performance of subject contracts in accordance with their terms. Our concern was <sup>formerly</sup> ~~first~~ expressed in the Government's message of

4 December 1975. As a result of the 4 December 1975 message, a meeting between representatives of Ampex Corporation and the Government was held on 18 December 1975. At the 18 December 1975 meeting, Ampex Corporation representatives confirmed the Government's belief that the contract performance schedules could not be met.

2. Amendment No. 6 of Contract No.  and Amendments No. 5

STAT

STAT and 6 of Contract No.  were supplemental agreements which established a revised program schedule. The completion date of both contracts was changed from 30 August 1975 to 30 August 1976. During our meeting of 18 December 1975,

STAT SUBJECT: Contract No. [ ] and Contract No. [ ]

STAT

Ampex representatives stated that the key milestone date for completion of O/S ASP is now projected for November 1976 in lieu of May 1976 date established in <sup>the</sup> revised program schedule. This slippage translates into a projected six-month extension of the completion dates of subject contracts.

Such slippage is not acceptable to the Government. <sup>is important to note</sup> It ~~should be pointed out~~

that the November 1976 projected date for completion of O/S ASP is based <sup>delivering a system which is not in accordance with the requirements of the</sup> upon Ampex's <sup>contracts AMPEX's position in this regard is also considered grounds</sup> ~~not conforming to the following contractual requirements:~~  
~~for default termination. The areas of concern are as follows:~~

a. Ampex is required to provide the capability of

a stand alone Storage Control Processor (SCP) <sup>can</sup> to access a Transport Driver (TD) <sup>for the purpose of initializing a TBM tape</sup> so that a TBM tape can be initialized.

b. The <sup>Mass Storage System</sup> ~~MSS~~ consists of five basic hardware modules.

A standard configuration allows for two Storage Control Processors, <sup>two external High Level Processors</sup> up to six Transport Drivers, up to 32 dual Transport Modules, and up to three Read/Write Data Channels. Each SCP shall be switchable to any Transport Driver. Any Transport Driver shall be capable of exercising control over any Data

STAT

SUBJECT: Contract No.  and Contract No.

STAT

Dual Transport Driver Module within a standard configuration through the switching matrices. Each EDCP shall be switchable to any Read/Write Channel.

*Access to the private disks of the NSS must be provided by*  
 c. ~~A Storage Control Processor requires a dedicated disc-  
 disk control units that are shared among the SCS and EDCPs.~~  
 controller to access the Mass Storage System's private files.

d. Functions must be split and/or shared between the two

Storage Control Processors. *←* Ampex Corporation did not present

*←* any evidence to reflect their position that the items mentioned

*←* above were not required by the contracts. If Ampex Corporation

*←* should concede that these items are required, the ~~proposed~~ com-

*←* pletion dates of the contracts would have to be extended even

*←* further.

3. PSAT

*3.5,* The Government is not aware of any excusable delays with re-

spect to your failure to perform within the requirements of the schedules

of the contracts. Therefore, unless the *contract can demonstrate that the* conditions cited above can be

cured within ~~ten~~ *fifteen* (30) days after receipt of this letter, the Government

may terminate subject contracts for default under Article 14 of Section E

STAT

SUBJECT: Contract No. [ ] and Contract No. [ ]

STAT

of the General Provisions of Contract No. [ ] and Article 13 of Section B

STAT

of the General Provisions of Contract No. [ ] The rights and remedies

STAT

of the Government provided for in the aforementioned articles are not exclusive but are in addition to any other rights and remedies provided by law or under the contracts.

3.  
4. The Redwood City PSAT failed because of deficiencies in both the hardware and software. Although the Redwood City PSAT was a minimal exercise, the failures encountered prevented the Government from testing all functions originally planned. In assessing your position regarding the results of PSAT, the Government disagrees with some of your statements concerning functions not tested at PSAT because they are recovery related or they were simply not considered a part of the Release 1 software. In summary, the Government does not share your optimism as to what the Redwood City PSAT demonstrated as far as your progress is concerned.